Reading Test

65 MINUTES, 52 QUESTIONS

Turn to Section 1 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage or pair of passages below is followed by a number of questions. After reading each passage or pair, choose the best answer to each question based on what is stated or implied in the passage or passages and in any accompanying graphics (such as a table or graph).

Questions 1-10 are based on the following passage.

This passage is adapted from Chen Cun, "Footsteps on the Roof." ©1992 by Chen Cun. Translation by Hu Ying. ©1995 by Hu Ying. The narrator is a man who has recently moved from Huangpu West, a neighborhood in Shanghai, to Huangpu East, a neighborhood across the river.

I moved here half a year ago.

The day before I moved, I met someone at a friend's home who claimed he could tell fortunes. As soon as he saw me, he congratulated me on my pending move. I smiled. It was no big secret. Then I asked casually if there was anything else to congratulate me for. He held my hand for a careful examination and said he saw a peach blossom, which meant lucky in love. After that, he stared intently at my palm for a long while.

"This romantic good fortune of yours is really peculiar. Look here, it lies hidden in the lines of your palm." He stroked my palm with his index finger. "Also, there is major yin influence."

"Any harm in that?" I asked.

"Can't tell."

This amateur fortune-teller was the first honest man I had met, someone who would actually admit that he couldn't tell. Which must have meant that he could tell about the other stuff.

The next day, I moved.

I should make it clear that even after finishing the move, I didn't have any luck that was even remotely peachy.

A chrysanthemum I had planted in a flowerpot was blooming—yellow petals, the kind the woman poet Li Qingzhao liked to write about. The mums made my empty balcony look like a small cemetery.

Now back to my move. The building was finished only a few years before, yet I was already the third owner of this apartment. The day I moved in was dark and cloudy. Our truck was stuck in the tunnel for a whole hour, until we were all seeing stars. By the time we emerged, a storm had come and gone. But the sky remained gloomy. On the porch in front of my building was a stain, a light brown one. At first, I didn't take any notice of it—until I stepped on it and slipped. I was puzzling over it when my friends started to carry my stuff upstairs. So I pulled myself together and followed them up.

The move was completed, and not a single neighbor had come out to watch the show.

It was dark by the time I saw my friends off. Standing at the curb, I looked at the building. Only a few lights were on, including my own two. Weeds grew amid heaps of construction material abandoned at the curb. The streetlight was broken, and there was darkness all around.

It was a bit of an effort to walk all the way up to the sixth floor. I opened the cast-iron gate and realized that someone was standing in the corridor, leaning over the banister to look down.

I cleared my throat.

"Are you the new tenant?" It was a woman with a very soft voice. Her door was half-open, and the light from inside lit up the tip of her nose. Some music wafted out, the kind with poor sound quality.

"Are you the owner of six-oh-two?" I asked.

"Oh, no. I used to live here, in six-oh-one. Just here to take a peek. No, I'm not the owner."

I couldn't very well pursue the matter, so after exchanging some pleasantries, I went back to my own apartment.

CONTINUE

Inside the new place, even the four walls felt cold. I didn't plan to stay here for long, so I decided not to paint the walls. The noise from the tunnel drifted up. I stood on the balcony and looked around for a while; then I moved the chrysanthemum to the windowsill. The blossoms were no longer fresh.

I started to gather together some odds and ends, tripping all over myself. Just to boost my spirits a bit, I turned on all the lights in the apartment. Still, it didn't feel bright. The walls were beige, painted by the previous owner. There were drawings by a childish hand, friendly like. And a faint footprint. A couple of mosquito corpses. At this point, the doorbell rang.

As I strolled over to the door, I tried to guess who it might be.

The door opened, and there was the neighbor I had met just a minute ago. I asked if anything was the matter.

She answered, beaming a bright smile, "If you have any questions, or if there's anything you don't know, just come and ask me."

"All right. I won't hold back."

Under the light, her face seemed pale, her lips painted a bright red. She had a pretty neck. Her hand rested casually against the doorframe, a young-looking hand. We were standing so close that I didn't look at her figure. She had a sort of baby face, but there were tiny wrinkles in the corners of her eyes.

"This place is different from Huangpu West," she said. "You hardly ever see anybody, and it might take some getting used to."

She gave me another smile and went back to her own apartment.

At this point, I remembered the fortune-teller's peach blossom. When the mums were fading, would a peach come into bloom?

1

Which choice best describes the narrator's perspective on the experience of moving into his new home?

A) He is initially disappointed but later feels better about it.

B) He feels that the process was challenging and rewarding.

C) He is dismayed that the experience wasn't more of an adventure.

D) He is amused by the day's many mishaps.

2

Which choice best characterizes the narrator's opinion of the fortune-teller he met?

A) He feels that the fortune-teller is not someone to be taken seriously.

B) He treats the fortune-teller with suspicion.

C) He believes that the fortune-teller may be able to predict the future.

D) He is disappointed that the fortune-teller makes vague predictions.

3

Which choice provides the best evidence for the answer to the previous question?

A) lines 2-5 ("The day . . . secret")

B) lines 5-9 ("Then . . . love")

C) lines 15-16 ("Any . . . tell")

D) lines 17-20 ("This . . . stuff")

4

The image of the chrysanthemum on the balcony (lines 25-28) mainly serves to suggest that

A) the narrator is confident about his ability to make a warm and inviting home in his new apartment.

B) despite the difficulty of the moving process, the narrator has made a good choice and will thrive in his new home.

C) the narrator's love for poetry and natural beauty permeates every aspect of his life.

D) the new apartment is so cold and bleak that even a beautiful flower can't transform it into a happy place.

5

In the context of the passage, the words "dark" and "cloudy" in lines 31-32 and the word "gloomy" in line 35 primarily serve to

A) heighten the contrast between the stormy weather and the excitement that the narrator and his friends are experiencing on the day of the move.

B) establish the dismal and foreboding atmosphere that characterizes the narrator's new home.

C) enhance the sense of dread and regret that the narrator feels as he leaves his old neighborhood.

D) provide a description of the day's weather that matches the narrator's irritable mood during the course of the move.

6

As used in line 38, the phrase "puzzling over" most nearly means

A) wondering about.

B) marveling at.

C) dazed by.

D) worrying about.

7

Which choice best supports the idea that the narrator has moved to a place characterized by dereliction and neglect?

A) lines 29-31 ("The building . . . apartment")

B) lines 35-38 ("On the . . . slipped")

C) lines 45-48 ("Weeds . . . around")

D) lines 70-73 ("I started . . . bright")

8

According to the passage, turning on all of the lights in the apartment reveals that

A) all of the rooms have spacious, airy interiors.

B) the apartment is much smaller than the narrator expected it would be.

C) the apartment has a warm and cozy feel.

D) there is evidence of the lives of previous tenants.

9

The use of the words "beaming" and "bright" in lines 82-83 primarily implies that the narrator's neighbor

A) fascinates the narrator with her kindness and beauty.

B) gives the narrator a hopeful feeling because her demeanor is such a contrast to the apartment's atmosphere.

C) inspires the narrator to make a point of meeting the other tenants in the building.

D) overwhelms the narrator with her friendly manner, making him relieved to retreat to his apartment.

10

Based on the passage, it can be reasonably inferred that compared to the narrator's new neighborhood, Huangpu West is characterized by

A) more opportunities to interact with people.

B) a shortage of available homes to buy or rent.

C) many gardens and lush, green spaces.

D) frequent storms and cloudiness.

Questions 11-21 are based on the following passage and supplementary material.

This passage is adapted from Steven C. Pan, "A Touch to Remember." ©2019 by Scientific American, a division of Springer Nature America, Inc.

When you grasp or brush against an object—anything from an outstretched hand to a leather-bound book—you are physically as close to it as you can possibly be. At that moment, specialized skin cells convey a wealth of information, such as shape, texture, size, and weight. Yet when you stop touching that object, much of that information appears to fade away rather quickly. After a few days, you may only be able to bring a vague impression to mind. It would seem then that the sense of touch is largely useful in the moment, and not much after that.

Over the decades, there has been surprisingly little research to test that assumption. Yet a common perspective is that the sense of touch is, by far, of limited use over the long term, and especially when compared to the visual system. However, a new study by Fabian Hutmacher and Christof Kuhbandner, researchers at the University of Regensburg, provides the strongest challenge yet to that perspective. Their finding: the sense of touch generates memories that are far more complex and long-lasting than previously thought.

In the study's first experiment, blindfolded participants "haptically explored" over 150 household objects for one hour. This involved them picking up and touching a series of kitchen utensils, stationery goods, and other items. They studied each object with their hands for 10 seconds each. Next, while remaining blindfolded, each participant completed a memory test. On this test, two nearly identical versions of each object were successively held (for instance, two dinner spoons). Only one of each had been presented before, and participants had to determine which.

When the memory test occurred just after the study period, participants chose the correct object correctly 94 percent of the time. Just briefly touching an object enabled them to distinguish it with almost perfect accuracy. Given the challenge of memorizing the many details that may differentiate an object from another (such as the curve of a spoon handle or its overall length), and the fact that hundreds of items were touched in a short period of time, that outcome is no small feat. Yet human beings can accomplish this with relative ease.

Just as impressively, when the memory test occurred a week later, very little had been forgotten. Thus, not only does touch generate memories that are highly detailed and precise, but those memories can endure over the long term.

A second experiment was even more startling. This time, a new group of blindfolded participants explored the same objects by touch. Rather than carefully study, they simply rated how pleasant each object felt. There was no intentional effort to memorize. A surprise memory test, occurring one week later, was designed to be more difficult: participants were no longer blindfolded and had to visually identify which of two nearly identical objects they had touched before—and without having previously seen either or having another opportunity to touch. Yet the accuracy rate remained high. Even when participants felt unsure and had to guess, they still identified the correct object more often than not.

It would appear then that the cognitive capacities of touch, which was among the first of the sensory systems to evolve, have long been underestimated. Contrary to the view that it is only useful in real time, touch leaves a memory trace that persists long after the physical sensation is gone. Moreover, information appears to be stored without much conscious awareness. As a result, those memories can manifest in interesting ways. For instance, you may not be able to verbalize how something felt, but you will be able to recognize it by grasping it or looking at it.

Figure 1

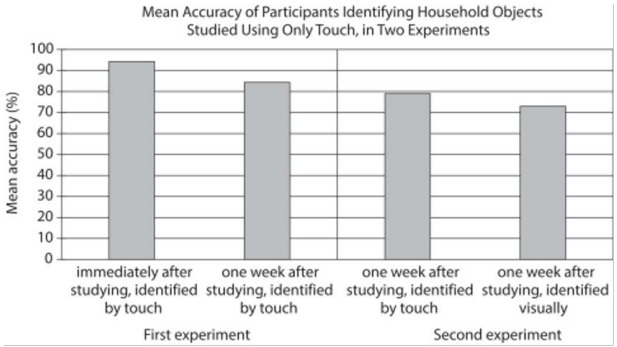
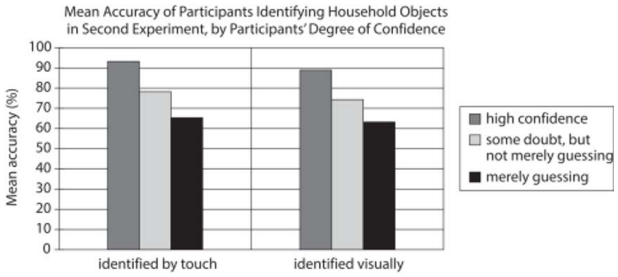


Figure 2



Figures adapted from Fabian Hutmacher and Christof Kuhbandner, "Long-Term Memory for Haptically Explored Objects: Fidelity, Durability, Incidental Encoding, and Cross-Modal Transfer." ©2018 by Fabian Hutmacher and Christof Kuhbandner.

11

It can most reasonably be inferred from the passage that the objects used in Hutmacher and Kuhbandner's experiments

A) possessed individually distinct physical characteristics.

B) tended to evoke pleasure in those who touched them.

C) are unlikely to be routinely encountered in daily life.

D) had been determined by other researchers to be especially memorable.

12

Which choice provides the best evidence for the answer to the previous question?

A) lines 23-27 ("In the . . . items")

B) lines 35-37 ("When . . . time")

C) lines 37-39 ("Just . . . accuracy")

D) lines 39-44 ("Given . . . feat")

13

As used in line 45, "relative" most nearly means

A) dependent.

B) comparative.

C) close.

D) appropriate.

14

The sixth paragraph (lines 51-64) mainly serves to

A) suggest that certain research results need to be confirmed.

B) describe a subsequent study that further probes a research question.

C) correct some previously overlooked shortcomings of an earlier study.

D) emphasize that research regarding touch has universal applications.

15

As used in line 54, "simply" most nearly means

A) directly.
B) quietly.
C) openly.
D) only.

16

According to the passage, an important difference between the memory tests in the first and second experiments is that in the second experiment, the memory test

A) was unexpected by the participants.
B) allowed participants to discuss their responses.
C) was administered immediately after participants had handled the objects.
D) permitted participants to touch objects a second time before responding.

17

It can most reasonably be inferred from the passage that the author believes that Hutmacher and Kuhbandner's research underscores a potential disconnect between

A) memories and feelings of pleasure.
B) verbal expression and tactile sensation.
C) initial impressions and long-term memory.
D) physical proximity and available information.

18

Which choice provides the best evidence for the answer to the previous question?

A) lines 48-50 ("Thus . . . term")
B) lines 53-55 ("Rather . . . felt")
C) lines 65-67 ("It would . . . underestimated")
D) lines 73-76 ("For . . . at it")

19

According to figure 1, in the first experiment, one week after studying the objects, the participants could correctly identify them by touch approximately which percentage of the time?

A) 60%–70%
B) 70%–80%
C) 80%–90%
D) 90%–100%

20

According to figure 2, the mean accuracy of participants who said they guessed when visually identifying objects was slightly

A) more than 60%.

B) more than 70%.

C) less than 80%.

D) less than 90%.

21

Which statement about trends in the identification of objects can be supported by the data presented in figure 2?

A) The lower the confidence level of participants, the greater their mean accuracy in identifying objects by touch but not in identifying objects visually.

B) The higher the confidence level of participants, the greater their mean accuracy in identifying objects both by touch and visually.

C) The more accurately participants identify objects visually, the less accurately they identify them by touch.

D) The more likely participants are to guess, the more accurately they identify objects both by touch and visually.

Questions 22-31 are based on the following passage and supplementary material.

This passage is adapted from Maddie Stone, "We've Been Wrong about Lichen for 150 Years." ©2016 by G/O Media Inc. Lichens are complex organisms composed of algae and fungi.

Hundreds of millions of years ago, a tiny green microbe [an alga] joined forces with a fungus, and together they conquered the world. It's a tale of two cross-kingdom organisms, one providing food and the other one shelter, and it's been our touchstone example of symbiosis for 150 years. Trouble is, that story is nowhere near complete.

A sweeping genetic analysis of lichen has revealed a third symbiotic organism, hiding in plain sight alongside the familiar two, that has eluded scientists for decades. The stowaway is another fungus, a basidiomycete yeast. It's been found in 52 genera of lichen across six continents, indicating that it is an extremely widespread, if not ubiquitous, part of the symbiosis. And according to molecular dating, it's probably been along for the ride since the beginning.

"I think this will require some rewriting of the textbooks," said Catherine Aime, a mycologist at Purdue University and co-author on the study published in Science.

Toby Spribille, who led the new analysis, has been studying lichens in one way or another for most of his life. He grew up in northwest Montana, where the shrubby, rubbery organisms are a ubiquitous part of the natural landscape. But when Spribille started to get serious about lichen research in grad school, he hit a roadblock.

"Lichens are nearly impossible to re-synthesize in the lab," Spribille said, explaining how the colonies take a long time to grow and the conditions needed to induce symbiosis are not well known. Unable to rear their test subjects in controlled environments, lichen researchers have struggled to perform basic experiments that could shed light on the roles of the different symbionts.

But recent advances in metagenomics—tools for extracting and sequencing DNA from environmental samples, no culturing required—offer a new way in. This approach caught Spribille's attention when he learned something very strange about Bryoria, a lichen found throughout conifer forests of the western United States and Canada.

"Bryoria have a long and storied cultural significance," Spribille said, explaining how certain Native American tribes relied on the lichen as winter survival food. "There's also evidence that first peoples would remove the more light colored ones and wash them, so that certain substances wouldn't make them sick."

Those substances include a toxin called vulpinic acid. The lichen that produces it, Bryoria tortuosa, can be distinguished from its non-toxic cousin, Bryoria fremontii, on the basis of its yellowish hue. But a few years back, when a group of biologists at the University of Helsinki tried to uncover the genetic basis for this difference using a targeted approach called barcoding, they were stumped.

"They found that the toxic and non-toxic forms [of the two species] were identical—at least, in the known parts of the lichen," Spribille said. "And they didn't really study it further. We looked at that and said, this is a classic question you could go at with genomics."

When Spribille and his colleagues analyzed Bryoria's RNA—the messenger form of DNA—they discovered something amazing. "We found that there was this third thing, riding along in every single sample," he said, referring to the previously unknown basidiomycete.

At first, the researchers worried that the extra RNA sequences could be contamination, a common pitfall of genomic research. And so, they decided to see if they could find the basidiomycete in other lichens, too. "We found it in everything," Spribille said. "From Alaska to Ethiopia to Antarctica, it always was there."

The final proof that this was not an elaborate hoax came when the researchers developed green fluorescent markers that attach to specific RNA sequences in the basidiomycete, and blue markers that attach to complementary RNA sequences in the other fungus, an ascomycete. Sure enough, when they added these markers to samples of lichen tissue, the cells of a hidden fungal partner glowed under the microscope.

We can't be certain the second fungus is present in all lichens. Spribille's study only looked at the lichens in the Parmeliaceae family, the most widespread and successful group on Earth today. But the entire lineage is vast and ancient, and it's possible some groups split off on the evolutionary tree before the basidiomycete arrived on the scene.

CONTINUE

22

In context, the main purpose of the sentence in line 6-7 ("Trouble . . . complete") is to

A) advance the argument that scientists still have much to learn about the interactions of organisms across kingdoms.
B) challenge the assertion that algae and fungi are especially dominant types of organisms.
C) suggest that research into lichens has generally been proceeding at too slow a pace.
D) introduce the idea that the most widely accepted understanding of lichens is flawed.

23

As used in line 8, "sweeping" most nearly means

A) indiscriminate.
B) spacious.
C) extensive.
D) unconditional.

24

In lines 9-11, the phrase "hiding in plain sight" and the words "eluded" and "stowaway" mainly serve to

A) identify the challenges inherent in using genetic analysis to isolate basidiomycete yeast.
B) characterize basidiomycete yeast as a component that was undetected even during studies of lichens.
C) highlight traits of basidiomycete yeast that led scientists to misclassify it as a different fungus.
D) hint at the likelihood that the presence of basidiomycete yeast will be visible in additional genera of lichen.

25

The passage indicates that molecular dating allowed Spribille's team to determine

A) that basidiomycete yeast has likely always been present in lichens in the Parmeliaceae family.
B) that the algae found in most locations around the world today have an ancient lineage.
C) the organism with which basidiomycete yeast first developed a symbiotic relationship.
D) the point in time when other common lineages of lichens branched off from the Parmeliaceae family.

26

A main purpose of the fifth paragraph (lines 28-35) is to

A) question the methodology scientists have used in most studies of lichens.
B) highlight the amount of time required to cultivate lichen colonies.
C) imply that scientists must find a new way to synthesize lichens.
D) explain some of the difficulties of conducting research involving lichens.

27

Based on the passage, the author would most likely characterize Spribille's team's conclusion about the RNA found in Bryoria tortuosa and Bryoria fremontii lichens as somewhat

A) ironic, because the team's attempt to isolate and identify a genetic difference between the two lichen species revealed a commonality between them instead.

B) puzzling, because the team had assumed that the presence of vulpinic acid in the lichens would prohibit the survival of other organisms.

C) satisfying, because the team's previous attempts to provide genetic proof of basidiomycete yeast in lichen samples had been inconclusive.

D) frustrating, because it seems unlikely that the team will be able to find the same evidence of basidiomycete yeast when they repeat their study with other lichen species.

28

Which choice provides the best evidence for the answer to the previous question?

A) lines 54-57 ("But . . . stumped")

B) lines 58-61 ("They . . . further")

C) lines 64-69("When . . . basidiomycete")

D) lines 70-72 ("At . . . research")

29

Which potential finding would provide the best support for the passage's main conclusion about lichens?

A) Researchers determine that the genetic markers particular to the algae in lichens are not susceptible to contamination.

B) Researchers collect more evidence to prove that the ascomycete in lichens has a unique RNA sequence.

C) Researchers learn that Bryoria's DNA sequences match those of lichens from other families.

D) Researchers discover that two distinct fungi are present in lichens outside the Parmeliaceae family.

30

Which conclusion about basidiomycete yeast is best supported by the passage?

A) It may have been absent in distant ancestors of the lichens that Spribille studied.

B) It may have initially developed as a result of lichen contamination during earlier studies.

C) It may be impossible to reproduce from cultures in a laboratory setting.

D) It may be a necessary component of symbiotic organisms other than lichens.

31

Which choice provides the best evidence for the answer to the previous question?

A) lines 28-31 ("Lichens . . . known")

B) lines 39-42 ("This . . . Canada")

C) lines 77-82 ("The final . . . ascomycete")

D) lines 89-92 ("But . . . scene")

Questions 32-41 are based on the following passage.

Passage 1 is adapted from a speech delivered to Parliament in 1780 by Edmund Burke. Passage 2 is adapted from a speech delivered to Parliament in 1784 by Sir John Saint Aubyn. Both men were elected members of the British Parliament, a legislative body that shared authority with the monarch.

Passage 1

To govern according to the sense and agreeably to the interests of the people, is a great and glorious object of government. This object cannot be
Line 5 obtained but through the medium of popular election; and popular election is a mighty evil. . . . They are the distempers of elections that have destroyed all free states. To cure these distempers is difficult, if not impossible; the only thing therefore left to save the commonwealth, is to prevent their 10 return too frequently. The objects in view are, to have parliaments as frequent as they can be without distracting them in the prosecution of publick business; on one hand, to secure their independence upon the people, on the other to give them that quiet 15 in their minds, and that ease in their fortunes, as to enable them to perform the most arduous and most painful duty in the world with spirit, with efficiency, with independency, and with experience, as real publick counsellors, not as the canvassers at a 20 perpetual election. . . .

All are agreed, that parliaments should not be perpetual; the only question is, what is the most convenient time for their duration? . . . We are agreed, too, that the term ought not to be chosen 25 most likely in its operation to spread corruption, and to augment the already overgrown influence of the Crown. On these principles I mean to debate the question. It is easy to pretend a zeal for liberty. Those, who think themselves not likely to be 30 encumbered with the performance of their promises, either from their known inability, or total indifference about the performance, never fail to entertain the most lofty ideas. They are certainly the most specious, and they cost them neither reflection 35 to frame, nor pains to modify, nor management to support. The task is of another nature to those, who mean to promise nothing that is not in their intention, or may possibly be in their power, to perform; to those, who are bound and principled no 40 more to delude the understandings than to violate the liberty of their fellow-subjects.

Faithful watchmen we ought to be over the rights and privileges of the people. But our duty, if we are qualified for it as we ought, is to give them 45 information, and not to receive it from them; we are not to go to school to them to learn the principles of law and government. In doing so, we should not dutifully serve, but we should basely and scandalously betray, the people, who are not capable of this service 50 by nature, nor in any instance called to it by the constitution.

Passage 2

Human nature is so very corrupt, that all obligations lose their force, unless they are frequently renewed. Long Parliaments become therefore 55 independent of the People; and when they do so, there always happens a most dangerous dependence elsewhere.

It has of late been denied that the People have a right of remonstrating to us. It has been called an 60 unjustifiable control upon our proceedings. But then let them have more frequent opportunities of varying the choice of their representatives, that they may dismiss such who have unfaithfully withdrawn their attention from them.

65 The influencing powers of the Crown are daily increasing, and it is highly requisite that Parliaments should be frequently responsible to their Constituents; that they should be kept under the constant awe of acting contrary to their interests. 70 Modern history, I believe, will inform us, that some very dangerous attempts upon our liberties have been disappointed; not so much from the virtue of many in this House, as from the apprehensions they may have had of an approaching election. . . .

75 I think too, that nothing can be of greater use to His Majesty than frequent new Parliaments; that he may often take the fresh sense of the nation, and not be partially advised. For his measures will always have a greater weight both at home and abroad, the more 80 generally he refers himself to the opinion of the People.

A farther mischief of long Parliaments is, that a Minister has time and opportunities of getting acquaintance with Members, and of practicing his 85 several arts to win them into his schemes. But this must be the work of time. Corruption is of so base a nature, that at the first sight it is extremely shocking. Hardly any one has submitted to it all at once. . . . One or two perhaps have deserted their colours the 90 first campaign, some have done it a second. But a great many, who have not that eager disposition to vice, will wait till a third.

CONTINUE

32

Burke indicates in Passage 1 that elections should not be so frequent that they

A) force legislators to adopt corrupt practices.
B) make legislators take their reelection for granted.
C) cause legislators to be inattentive to their duties.
D) lead legislators to become self-important.

33

Based on Passage 1, Burke most likely believes that for some politicians, proposing idealistic plans is a way of

A) advancing the well-being of the nation by promoting progressive thinking.
B) displaying an optimistic outlook that enhances their speeches.
C) encouraging voters to end their allegiance to the Crown.
D) giving the appearance of caring more about constituents than they actually do.

34

Which choice provides the best evidence for the answer to the previous question?

A) lines 1-3 ("To govern . . . government")
B) lines 3-5 ("This . . . evil")
C) lines 28-33 ("It is . . . ideas")
D) lines 33-36 ("They . . . support")

35

In Passage 1, Burke's use of the word "watchmen" (line 42) serves mainly to

A) clarify the role of legislators in protecting the freedoms of the governed.
B) illustrate a misconception held by a number of uninformed voters.
C) emphasize the importance of legislators in shaping public opinion about controversies.
D) acknowledge that legislators must ultimately yield to the Crown's sovereignty.

36

In Passage 2, Saint Aubyn emphasizes the significance of past situations in which the rights of the people were most strongly protected by the

A) legislators' concern about an upcoming election.
B) legislators' commitment to their personal integrity.
C) voters' anxieties about intervention by the Crown.
D) voters' demands for the removal of corrupt leaders.

37

As used in line 85, "arts" most nearly means

A) sophisticated skills.
B) original interpretations.
C) conventional rules.
D) beautiful creations.

38

Based on Passage 2, Saint Aubyn would likely attribute most of the corruption among government representatives to a

A) human failing that leads them to yield to temptation too easily.
B) naïveté that prevents them from recognizing dishonest motives in fellow representatives.
C) lack of vigilance regarding a monarch's tendency to wrest power from elected leaders.
D) steady deterioration of values that gradually undermines the mission of elected leaders.

39

Which choice from Passage 2 best represents Saint Aubyn's likely response to Burke regarding the problem of legislators who make "specious" (line 34, Passage 1) proposals to their constituents?

A) lines 52-54 ("Human . . . renewed")
B) lines 54-57 ("Long . . . elsewhere")
C) lines 60-64 ("But . . . them")
D) lines 78-81 ("For . . . People")

40

Based on Passage 1, Burke would most likely reject the concept of a "right of remonstrating" (line 59, Passage 2) by arguing that voters do not possess

A) adequate knowledge of the Crown's intentions.
B) firsthand experience of collective negotiations.
C) persistent motivation to advise legislators on policy.
D) sufficient wisdom to arrive at sound judgments.

41

Based on Passage 1, Burke would most strongly assert that Saint Aubyn's assumption about an effective way to obtain a "fresh sense of the nation" (line 77, Passage 2) is at odds with conditions that would lead to a

A) civil and harmonious tone during frequent legislative campaigns.
B) vigorous and sustained effort to discredit the Crown.
C) stable and calm environment for legislative deliberation.
D) clear set of ethical standards being adopted for legislators to follow.

Questions 42-52 are based on the following passage.

This passage is adapted from Paul South, "Helping Plants Remove Natural Toxins Could Boost Crop Yields by 47 Percent." ©2018 by The Conversation US, Inc.

When it comes to photosynthesis, plants use sunlight to power a chemical reaction that converts carbon dioxide and water to sugars and oxygen. But that isn't the only chemical reaction that occurs in plants. A quirk in the evolution of the protein, called Rubisco, is that sometimes instead of converting carbon dioxide during photosynthesis, it uses oxygen instead. This produces waste products such as glycolate and ammonia, which can be toxic to plants and slow or stunt their growth.

To remove these toxic chemicals, another process needs to kick into gear. Photorespiration is a part of natural plant metabolism that recycles these toxins. It is a necessary process in major crops including rice, wheat and soybeans, as well as most fruit and vegetable crops.

Recycling these toxic byproducts sucks up a huge portion of the plants' energy—and can inhibit the plant's growth by more than 30 percent. At higher temperatures, plants tend to increase the amount of oxygen they convert, so as growing season temperatures rise and heat waves strike,up to 50 percent of the energy generated from photosynthesis can be required for photorespiration to recycle toxins in major crops like wheat and soybeans. That slashes yields in the hotter and drier regions of the world, such as sub-Saharan Africa and Southeast Asia, where food is most needed.

To meet the growing demand for increased food production, I worked with an international team to explore whether speeding up photorespiration might boost crop yields.

The work, led by Professor Christine Raines and Patricia López-Calcagno, explored whether this modification could boost the production of tobacco plants.

We managed to speed up the recycling of these toxins by designing plants that produce more of a protein, called the H-protein, that is already present in our crop plants and plays a role in photorespiration. Previous work in the lab using the small plant Arabidopsis, the "lab rat" of plant research, suggested that increasing the quantity of H-protein could speed up photorespiration and enable our plants to grow larger. Our team translated this idea from the lab to the field using a strain of tobacco, Nicotiana tabacum, which we grew outside at a research field station.

We discovered pretty quickly that we had to carefully control the quantity of the H-protein we engineered plants to produce. Too much H-protein in all parts of the plant was harmful, stunting growth and reducing yield of tobacco leaves. Thus, we fine-tuned our approach and engineered plants that manufactured the H-protein only in the leaves. This increased photosynthesis and plant growth, probably because of faster recycling of the toxic chemicals.

We tested our hypothesis in tobacco because it is an excellent model for proof-of-concept research. It is easy to genetically engineer and only has a four-month life cycle, allowing us to conduct several trials in one field season. This allows us to test various genetic modifications in tobacco and then translate those discoveries to make improvements in targeted food crops.

To fine-tune the expression of the H-protein, the team engineered the tobacco using DNA from a close relative, Solanum tuberosum, or potato. Using a known sequence of potato DNA, we were able to boost the H-protein specifically in the desired leaf tissue. That proved to be the key to increasing yield without harming the plant.

Initially, I was skeptical that boosting the production of a single protein out of thousands in the plant could have such a dramatic impact on crop yield. But, after two years of field trials, my colleagues and I have demonstrated that increasing H-protein levels leads to larger plants, boosting the crop yield by 27–47 percent.

Figure 1

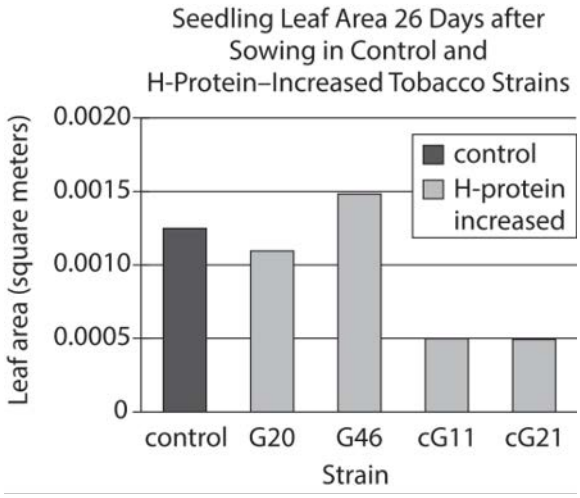
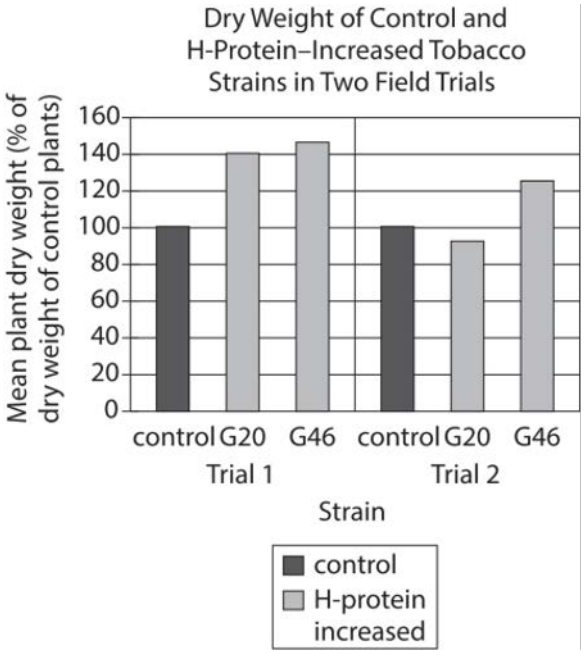


Figure 2



Figures adapted from Patricia E. López-Calcagno et al., "Overexpressing the H-Protein of the Glycine Cleavage System Increases Biomass Yield in Glasshouse and Field-Grown Transgenic Tobacco Plants." ©2018 by Patricia E. López-Calcagno et al.

42

Which choice provides the best evidence for the answer to the previous question?

A) plants' use of sunlight in photosynthesis to an analysis of previous attempts by researchers to prevent oxygen conversion during photorespiration.

B) naturally occurring chemical processes in plants to an account of experimental efforts to examine the effect of certain genetic modifications on crop yield.

C) the impact of climate on crop yield to an evaluation of a hypothesis about how temperature affects production of a particular protein in plants.

D) proteins essential to the removal of toxins in plants to an explanation of how those proteins' importance to photosynthesis was first identified in a laboratory.

43

As used in line 2, "power" most nearly means

A) activate.

B) authorize.

C) engineer.

D) dominate.

44

Which statement about the production of toxins resulting from Rubisco's conversion of oxygen in certain crop plants is best supported by the passage?

A) Oxygen conversion results in higher levels of toxins in major crop plants than it does in other plant varieties.

B) The presence of toxins in the plants results in a greater reduction in plant growth than does photorespiration.

C) As environmental temperatures decrease, photorespiration recycles the toxins in the plants less effectively.

D) As environmental temperatures decrease, the amount of the toxins produced in the plants decreases.

45

Which choice provides the best evidence for the answer to the previous question?

A) lines 14-16 ("It is . . . crops")
B) lines 17-19 ("Recycling . . . percent")
C) lines 19-25 ("At higher . . . soybeans")
D) lines 25-28 ("That . . . needed")

46

When the author says that he and the other researchers "translated this idea from the lab to the field" (lines 45-46), he most likely means that they

A) applied a concept to a new environment.
B) predicted variable study results based on a new setting.
C) adjusted their hypothesis to account for a different location.
D) changed the experimental process to accommodate a different venue.

47

The passage indicates that the use of Solanum tuberosum DNA allowed the researchers to

A) reduce the amounts of glycolate and ammonia produced in the tobacco plants by slowing photorespiration.
B) localize increased production of H-protein to an area that is most beneficial in the tobacco plant.
C) confirm whether boosting production of proteins other than H-proteins would have a similar effect on tobacco plant growth.
D) determine whether their experimentation with the tobacco plants could be harmful to other major crop plants.

48

The main purpose of the last paragraph is to

A) express a researcher's sustained surprise about a finding.
B) illustrate the evolution of a researcher's confidence in a hypothesis.
C) highlight the time-consuming nature of a project.
D) endorse the simplification of a technique for future use.

49

Information from the passage best supports which potential explanation for the data in figure 1 regarding the leaf area of H-protein–increased strains?

A) Arabidopsis DNA to produce more H-proteins without harming the plants.ns?"The G20 and G46 strains were modified with
B) The cG11 and cG21 strains produced H-proteins throughout the plants in amounts that damaged them.
C) Photorespiration occurred at a faster rate in the cG11 and cG21 strains than in the G20 and G46 strains.
D) H-proteins were more concentrated in the leaves of the cG11 and cG21 strains than they were in the G20 and G46 strains.

50

Which choice provides the best evidence for the answer to the previous question?

A) lines 41-45 ("Previous . . . larger")
B) lines 49-51 ("We discovered . . . produce")
C) lines 51-53 ("Too . . . leaves")
D) lines 55-57 ("This . . . chemicals")

CONTINUE

51

Based on figure 2, the researchers' most successful attempt to boost tobacco yield resulted in a mean plant dry weight that was approximately which percentage of the dry weight of control plants?

A) 125%
B) 140%
C) 145%
D) 160%

52

Based on the passage and figure 2, which strain of H-protein–increased tobacco plant has data that are the furthest from the results presented in jump to lines 76-79 ("But . . . percent")?

A) G20 in trial 1
B) G46 in trial 1
C) G20 in trial 2
D) G46 in trial 2

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

Writing and Language Test

35 MINUTES, 44 QUESTIONS

Turn to Section 2 of your answer sheet to answer the questions in this section.

DIRECTIONS

Each passage below is accompanied by a number of questions. For some questions, you will consider how the passage might be revised to improve the expression of ideas. For other questions, you will consider how the passage might be edited to correct errors in sentence structure, usage, or punctuation. A passage or a question may be accompanied by one or more graphics (such as a table or graph) that you will consider as you make revising and editing decisions.

Some questions will direct you to an underlined portion of a passage. Other questions will direct you to a location in a passage or ask you to think about the passage as a whole.

After reading each passage, choose the answer to each question that most effectively improves the quality of writing in the passage or that makes the passage conform to the conventions of standard written English. Many questions include a "NO CHANGE" option. Choose that option if you think the best choice is to leave the relevant portion of the passage as it is.

Questions 1-11 are based on the following passage.

An Advocate for Alaska Native Rights

Fifteen-year-old Alberta Schenck was fed up. In the first half of the twentieth century, Indigenous peoples living in what was then the US territory of Alaska 1 <u>was</u> subject to pervasive discrimination, including segregation from white residents in settings such as schools, stores, restaurants, and movie theaters.

1

A) NO CHANGE
B) is
C) has been
D) were

Schenck, whose mother was Inupiaq, worked at one 2 of them. In her job as an usher, she not only witnessed the segregation of other Alaska Natives but also was 3 obliged to uphold the theater's segregationist seating policy. By March 1944, her fury at the system of inequality had reached a breaking point. Schenck decided to act, setting off a series of events that 4 helped encourage dozens of Native Americans to go to the theater and sit where they wanted.

2

A) NO CHANGE
B) of these.
C) such theater.
D) type of those.

3

A) NO CHANGE
B) obliged and compelled to uphold
C) compelled to uphold and enforce
D) obliged to uphold—that is, enforce—

4

Which choice most effectively establishes the significance of the series of events discussed in the paragraphs that follow?

A) NO CHANGE
B) influenced the community of Nome to elect Schenck as their "Queen of Nome."
C) united an outspoken teenager and a powerful politician in the fight against racism.
D) helped inspire the passage of a groundbreaking law banning discrimination in Alaska.

Schenck's initial act of protest took the form of a letter that she wrote to the editor of the Nome Nugget, a local newspaper. In her letter, Schenck spoke out against the seating of Alaska Native and white patrons in 5 unrelated sections of Nome's Dream Theater. Her public condemnation led to her being fired from her job, but Schenck persisted in openly opposing segregation. She publicly protested again later that spring, sitting in the "whites only" section of her former workplace. Schenck was removed from the building. When she tried to reenter by purchasing another ticket, she was arrested and sent to jail.

After her arrest, Schenck was encouraged by a family friend to contact Alaska territorial governor Ernest Gruening, who was sympathetic to equal rights causes. Moved by her story, Gruening 6 supported Schenck, securing an apology from the mayor of Nome for her treatment. Schenck's influence did not end there, 7 in other words. In 1945, when the Alaska territorial legislature was debating an equal rights 8 bill. Her experience was cited as a "prime example" of the unfair treatment of minority groups.

5

A) NO CHANGE
B) disjointed
C) separate
D) withdrawn

6

A) NO CHANGE
B) will support
C) is supporting
D) supports

7

A) NO CHANGE
B) consequently.
C) however.
D) after all.

8

A) NO CHANGE
B) bill, her
C) bill and her
D) bill; in which her

Her story affected lawmakers just as it had Gruening, and it helped **9** assure the passage of the Alaska Anti-Discrimination Act of **10** 1945.

Schenck retroactively came to be known as the "Rosa Parks of Nome" because she had inspired many Alaska Natives to refuse to change seats in movie theaters **11** only months before the first two Alaska Natives were elected as House representatives to Alaska's territorial legislature. By challenging discrimination and asserting, as she did in her letter, that all Americans have the right to sit or go where they please, Schenck played an important early role in advancing equality in the United States.

9

A) NO CHANGE
B) assure, the passage
C) assure the passage:
D) assure—the passage

10

The writer is considering revising the underlined portion to the following.

1945, the first piece of US legislation to outlaw discrimination.

Should the writer make this revision?

A) Yes, because it underscores the historical significance of this piece of legislation.
B) Yes, because it demonstrates the importance of antidiscrimination legislation.
C) No, because it interrupts the paragraph's discussion of Schenck's story with irrelevant information.
D) No, because it fails to describe the antidiscrimination legislation in sufficient detail.

11

Which choice most logically builds on the information provided earlier in the paragraph?

A) NO CHANGE
B) during a time when English literacy requirements prevented many Alaska Natives from voting.
C) much as Parks, eleven years later, had inspired African Americans to reject segregated seating on buses.
D) with the support of a governor who fought for civil rights in Alaska after fighting for freedom abroad during World War II

Questions 12-22 are based on the following passage.

The Business of Entrepreneurship Education

Over the last few decades the number of institutions around the world offering entrepreneurship education (EE) programs has grown to over three thousand. Research shows that many of these programs **12** use and employ the format of standard lectures to teach students how to successfully develop and manage new business **13** ventures, but modern scholars studying EE note that entrepreneurs learn best through hands-on experience. Therefore, although there is a place in the EE curriculum for traditional instruction, the emphasis needs to be on activities that allow students to practice real entrepreneurship, both inside and outside the classroom.

One EE program that provides such experiential opportunities can be found at the Dún Laoghaire Institute of Art, Design and Technology (IADT) in Ireland. **14** Founded in 1997, the Institute enrolls over two thousand students. There, entrepreneurship students in one class are required to work in teams to develop products for sale at a local market.

12

A) NO CHANGE
B) use the lecture format, which is standard, employing it
C) employ the conventional, standard lecture format in order
D) use the standard lecture format

13

A) NO CHANGE
B) speculations,
C) missions,
D) exertions,

14

The writer is considering deleting the underlined sentence. Should the sentence be kept or deleted?

A) Kept, because it establishes the school's credentials.
B) Kept, because it provides a detail important for understanding the school's teaching methods.
C) Deleted, because it introduces information irrelevant to the discussion of entrepreneurship education.
D) Deleted, because it fails to describe the philosophy upon which the school was founded.

The students research the market and its potential customers and **15** to devise plans for implementing the logistical duties of entrepreneurship, **16** including financing, marketing, and merchandising. After selling their products, students finish the project by completing financial and overall assessments of their own performance. Staff and student feedback on IADT's action-based entrepreneurship activities has been positive: Rachel **17** Parke, a student in the program comments that it "has given me all the skills and the tools that I need."

15

A) NO CHANGE
B) devise
C) will devise
D) devising

16

Which choice best expands on the topic introduced earlier in the sentence?

A) NO CHANGE
B) with the students working in self-selected groups.
C) though instructors evaluate student work on a continual basis.
D) tasks all completed alongside other coursework.

17

A) NO CHANGE
B) Parke, a student, in the program,
C) Parke a student in the program
D) Parke, a student in the program,

[1] In addition to receiving student endorsement, the **18** usefulness of practical approaches like the one adopted by IADT is also supported by empirical evidence. [2] For their study, the researchers surveyed one hundred thirty students twice during a semester on their ideas for business opportunities. [3] A Utah State University study showed that practical assignments help budding entrepreneurs develop a key **19** skill opportunity identification, that helps entrepreneurs recognize unmet consumer demands that can be turned into revenue streams. [4] One group of students, the experimental group, spent the semester taking a business course that prioritized hands-on exercises aimed at developing the participants' opportunity identification, while a control group received traditional instruction.

18

A) NO CHANGE
B) usefulness—of practical approaches—
C) usefulness of practical approaches,
D) usefulness of practical approaches:

19

A) NO CHANGE
B) skill, opportunity
C) skill; opportunity
D) skill. Opportunity

[5] At the end of the course, the experimental group students generated more ideas for business opportunities than **20** they did, and those ideas were often more innovative as well. **21**

Admittedly, some content knowledge—like writing business plans and understanding legal requirements—can be most effectively covered through textbooks and lectures. **22** Thus, EE programs should continue to feature traditional education methods as key components of the curriculum.

20

A) NO CHANGE
B) some participants
C) others
D) the control group students

21

To make this paragraph most logical, sentence 2 should be placed

A) where it is now.
B) after sentence 3.
C) after sentence 4.
D) after sentence 5.

22

The writer wants an effective concluding sentence that restates the main argument of the passage. Which choice best accomplishes this goal?

A) NO CHANGE
B) It remains to be seen whether hands-on learning has a long-term positive impact on entrepreneurial activity.
C) But much of EE instruction can and should integrate experiential components that enable students like Parke to practice what they learn.
D) Students should also be given opportunities to learn by working as interns in existing businesses.

Questions 23-33 are based on the following passage and supplementary material.

Digging Urchins

Along the western seashores of North America 23 dwell the purple sea urchin, Strongylocentrotus purpuratus. This small, spiny animal can live for up to seventy years inside of rock cavities, or 24 pits that grant protection from predators and strong waves. For over a century, scientists have debated whether S. purpuratus finds and occupies existing pits or whether it actively excavates its own. The latter hypothesis is supported by the work of biologist Michael P. Russell of Villanova University, who has 25 recently provided the first evidence that the urchin itself breaks down these hard rock surfaces and that this process, known as bioerosion, has broader ramifications.

23

A) NO CHANGE
B) dwells
C) are dwelling
D) have dwelled

24

A) NO CHANGE
B) pits;
C) pits—
D) pits,

25

A) NO CHANGE
B) in recent times provided
C) recently provided and offered
D) only just recently provided

26 Though many animals regularly contribute to bioerosion, Russell and his team brought individual purple urchins from their natural environment into the laboratory and placed each in an enclosure atop one of three rock **27** types granite, mudstone, or sandstone (fine and medium grain). The mass of each rock was measured before urchin introduction and then again one year later. In the end, each rock type showed an average loss of mass that was notably larger than **28** each of its control group, which had no urchins. The researchers then used their findings to calculate the average annual rate of bioerosion caused by an individual urchin.

These data, when compared with size measurements of urchin pits in nature, allowed Russell to **29** make estimates about urchins. He could estimate both the time required for an urchin to form an average-sized pit in each rock type and the total amount of bioerosion that urchin populations could cause.

26

Which choice provides the most effective introduction to the paragraph?

A) NO CHANGE
B) To investigate the urchin's ability to erode rock,
C) After obtaining a permit from the California Department of Fish and Wildlife,
D) In a study later published in the journal PLOS ONE,

27

A) NO CHANGE
B) types;
C) types,
D) types:

28

A) NO CHANGE
B) those of
C) that of
D) DELETE the underlined portion.

29

Which choice most effectively combines the sentences at the underlined portion?

A) make estimates, including estimates about
B) make estimates, including
C) make estimates about
D) estimate

With granite, which was reduced by only 0.88 gram per urchin per year, it would take an urchin almost 150 years to form an average-sized pit. In contrast, bioerosion of medium-grain sandstone occurred at a more rapid rate of **30** 32.4 grams per urchin per year, which would allow an urchin to create a pit in just 4.5 years. **31** Although higher densities of sea urchins live on sandstone-rich rocky shores than live on granite, these urchins' combined excavations could quickly erode large volumes of sandstone into sediment, producing, by Russell's estimate, **32** 2.9 tons of granite sediment per hectare each year.

Measured Annual and Estimated Long-Term Bioerosion Rates by S. purpuratus

	Type of rock Average bioerosion (grams per urchin per year)	Time to form pit (years)	Population bioerosion (tons per hectare per year)
Granite	0.88	147.5	2.9
Mudstone	2.73	143.2	4.2
Sandstone (medium grain)	32.4	4.5	199.1
Sandstone (fine grain)	4.78	31.9	29.4

Adapted from Michael P. Russell, Victoria K. Gibbs, and Emily Duwan, "Bioerosion by Pit-Forming, Temperate-Reef Sea Urchins: History, Rates and Broader Implications." ©2018 by Michael P. Russell, Victoria K. Gibbs, and Emily Duwan.

30

Which choice most accurately represents the information in the table?

A) NO CHANGE
B) 31.9
C) 4.78
D) 2.73

31

A) NO CHANGE
B) Because
C) Even if
D) DELETE the underlined portion, adjusting the capitalization as needed.

32

Which choice most effectively uses data from the table?

A) NO CHANGE
B) 4.2 tons of mudstone
C) 29.4 tons of fine-grain sandstone
D) 199.1 tons of medium-grain sandstone

Russell's research presents a convincing argument that 33 purple sea urchins are responsible for substantial bioerosion. The high amounts of sediment produced by this bioerosion can adversely affect aquatic life. For example, excess sediment can become suspended in water and smother fish eggs, lowering hatch rates. Such sediment can also block light from penetrating the water, which changes the depth at which aquatic plants can live, detrimentally affecting the entire ecosystem. Additional research is required to better understand the long-term effects of this urchin behavior.

33

Which choice provides the best transition from the previous paragraph to this one?

A) NO CHANGE

B) granite is more resistant to urchin bioerosion than other types of rock are.

C) any individual urchin is only responsible for a small amount of bioerosion.

D) it would take longer than a typical urchin's lifetime to form a pit in mudstone.

Questions 34-44 are based on the following passage.

Black Panther's Formula

In February 2018—after viewing its trailer millions of times, buying advance tickets for it in record-setting numbers, and tweeting about it more than any other movie in history— **34** the superhero blockbuster Black Panther was watched by moviegoers in packed theaters around the world. Telling the story of T'Challa, the titular hero and heir to the throne of the fictional African nation of Wakanda, Black Panther became a cultural phenomenon and a commercial success, earning more than one billion dollars at the box office, one of the largest grosses of all time.

Critics lauded the film's predominantly Black **35** cast its director, Ryan Coogler; its Kendrick Lamar–produced soundtrack; and its Afrofuturist aesthetic. Nevertheless, couched within their praise, a few critics noted that **36** the villain is more compelling than the hero, which is rare for the superhero genre. For instance, National Public Radio's Glen Weldon claimed that Black Panther dutifully checks the "'Hero Fights Evil Version of Himself' box," one of the genre's most-used narrative devices. Weldon is correct: many of the films in the Marvel Cinematic Universe—the franchise of superhero films to which Black Panther belongs—feature such battles. In Iron Man, The Incredible Hulk, Thor, Captain America, Ant-Man, and Doctor Strange (to name a few), the heroes confront villains who mirror their superpowers.

34

A) NO CHANGE
B) theaters around the world were packed with moviegoers watching the superhero blockbuster Black Panther.
C) moviegoers packed theaters around the world to watch the superhero blockbuster Black Panther.
D) around the world, the superhero blockbuster Black Panther was watched by moviegoers in packed theaters.

35

A) NO CHANGE
B) cast:
C) cast,
D) cast;

36

Which choice most effectively establishes the main idea of the paragraph?

A) NO CHANGE
B) Black Panther is more explicitly political than many films in
C) the computer-generated imagery in the film is unrealistic at some points, though this is a common complaint about
D) the film employs many of the well-worn tropes of

Black Panther is no different. Both T'Challa and his nemesis, Erik "Killmonger" Stevens, are empowered **37** by a tradition (a ritual involving a fictitious heart-shaped herb), a technology (a suit made from the mythical metal vibranium), and a throne (a claim to Wakanda's crown).

[1] Superhero films—the best ones, at **38** least ruminate on the nature of power and responsibility, and the hero-versus-evil-counterpart formula **39** had been a means to facilitate such contemplation. [2] The striking similarities between T'Challa and Killmonger **40** really show that those guys aren't the same in their attitudes toward their powers.

37

A) NO CHANGE
B) on
C) for
D) in

38

A) NO CHANGE
B) least, ruminate
C) least ruminate—
D) least—ruminate

39

A) NO CHANGE
B) was
C) is
D) will be

40

A) NO CHANGE
B) emphasize the profound differences
C) help us viewers see just how different they are
D) are like a giant, brilliant spotlight that illuminates the contrast

[3] At the start of the film, T'Challa believes that he must use his powers to keep Wakanda safe from the turmoil of the outside world; Killmonger, on the other hand, seeks to use his, along with Wakanda's vast resources, to **41** revise centuries of injustice, even if that means subjugating the world in the process. **42**

41

A) NO CHANGE
B) tailor
C) rectify
D) alter

42

The writer wants to add the following sentence to this paragraph.

> Still, it would be a mistake to dismiss Black Panther as formulaic.

The best placement for the sentence is

A) before sentence 1.
B) after sentence 1.
C) after sentence 2.
D) after sentence 3.

The collision between T'Challa and Killmonger is more than a physical duel: it is a philosophical debate rendered concrete, with 43 protagonists becoming perspectives. Far from being an artistic flaw, then, this formula foregrounds Black Panther's conversation about power, leading commentators like Slate's Jamelle Bouie to conclude, 44 "Of course, Black Panther isn't a political thriller."

43

Which choice best elaborates on the idea presented earlier in the sentence?

A) NO CHANGE
B) attitudes becoming abstractions.
C) identities becoming ideas.
D) concepts becoming characters.

44

Which quotation from Bouie best concludes the passage?

A) NO CHANGE
B) "It isn't just great for what it is. It's great for what it says."
C) "Black Panther is unmistakably a film from Marvel Studios."
D) "There are no mouthpieces speaking on behalf of the writers."

STOP

If you finish before time is called, you may check your work on this section only. Do not turn to any other section.

Math Test – No Calculator

25 MINUTES, 20 QUESTIONS

Turn to Section 3 of your answer sheet to answer the questions in this section.

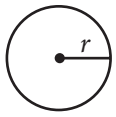
DIRECTIONS

For questions 1-15, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. **For questions 16-20**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 16 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

NOTES

1. The use of a calculator **is not permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

REFERENCE



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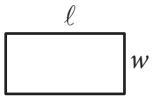
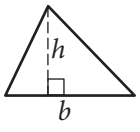
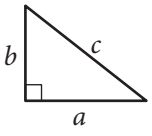
$C = 2\pi r$



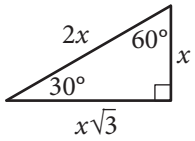
$A = \ell w$

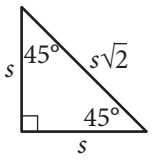


$A = \frac{1}{2}bh$

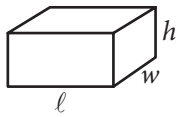


$c^2 = a^2 + b^2$

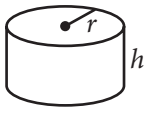




Special Right Triangles

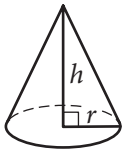


$V = \ell wh$

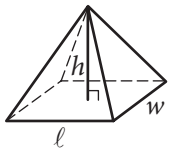


$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

1

A certain university offers courses that are either 3 credits or 4 credits per course each semester. A student registered for a total of 16 credits for the fall semester. Which equation represents the possible number of 3-credit courses, x, and 4-credit courses, y, that the student could have registered for?

A) $3x+4y=7$

B) $3x+4y=16$

C) $x+y=7$

D) $x+y=16$

2

The function f is defined by $f(x)=x+3$. What is the y-intercept of the graph of $y=f(x)$ in the xy-plane?

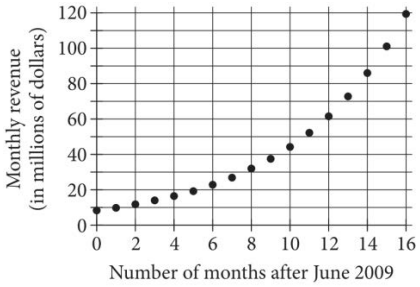
A) (0,-3)

B) (0,-1)

C) (0,1)

D) (0,3)

3



The graph shown models the monthly revenue, in millions of dollars, for a particular marketing company from June 2009 through October 2010. According to the model, which of the following is closest to this company's monthly revenue, in millions of dollars, for June 2009?

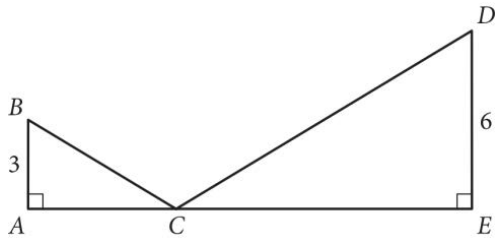
A) 8.5

B) 22.5

C) 62

D) 100

4



In the figure shown, right triangle ABC is similar to right triangle EDC, where $\angle ACB$ is congruent to $\angle ECD$ and $AE=15$. What is the length of $\overline{CE}$?

A) 4

B) 5

C) 8

D) 10

5

Which polynomial is equivalent to $(12x^4 - 5x + 18) + (6x^4 + 13x^2 + 7x - 9)$?

A) $(18x^8 + 13x^3 + 2x + 9)$

B) $(18x^8 + 8x^3 + 25x - 9)$

C) $(18x^4 + 13x^2 + 2x + 9)$

D) $(18x^4 + 8x^2 + 25x - 9)$

6

The equation $y = \frac{x + w}{z}$ relates the positive numbers w, x, y, and z. Which equation correctly expresses x in terms of w, y, and z ?

A) $x=yz-w$

B) $x=yz+w$

C) $x = \frac{z}{wy}$

D) $x = \frac{y}{zw}$

7

$g(x)=-0.038x+2.136$

The given linear function g models the annual percentage increase in the population of India x years after 1990. What is the best interpretation of $g(20)=1.376$ in this context?

A) 1.376 years after 1990, the percentage increase in the population of India was 20% over the previous year.

B) 1.376 years after 1990, India's population was approximately 20 times its population in 1990

C) 20 years after 1990, the percentage increase in the population of India was 1.376% over the previous year.

D) 20 years after 1990, India's population was approximately 1.376 times its population in 1990.

8

$f(x)=a(x-b)(x-c)$

For the quadratic function f shown, a, b, and c are constants. For the graph of the $y=f(x)$ in the xy-plane, the quadratic function f opens upward, and the coordinates of its vertex are both negative. Which of the following could be true?

A) $a<0, b<0, c<0$

B) $a<0, b>0, c>0$

C) $a>0, b<0, c<0$

D) $a>0, b>0, c>0$

CONTINUE

9

$$2x+6y=2$$

$$2(2x+y)=20$$

How many solutions does the given system of equations have?

A) Zero
B) Exactly one
C) Exactly two
D) Infinitely many

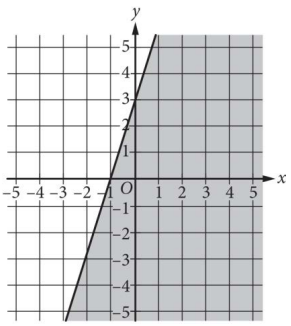
10

$$|2x+6|+4=8$$

What is the sum of the solutions to the given equation?

A) -6
B) -3
C) 0
D) 8

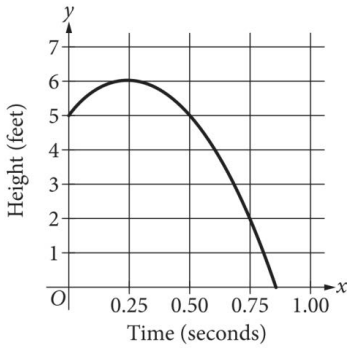
11



The shaded region shown represents the solutions to which inequality?

A) $3x - y \leq -3$
B) $3x - y \geq -3$
C) $3x + y \leq 3$
D) $3x + y \geq 3$

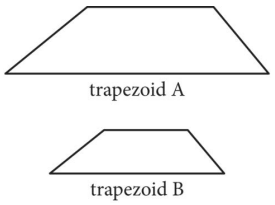
12



The graph shown models the height y, in feet, of a volleyball x seconds after it was hit by a player. Which equation represents the relationship between the height of the volleyball and the time since the volleyball was hit?

A) $y = -16x^2+5$
B) $y = -16(x - 5)^2$
C) $y = -16(x - 0.86)^2$
D) $y = -16(x - 0.25)^2+6$

13



Note: Figures not drawn to scale.

Trapezoid A and trapezoid B shown are similar. The length of each side of trapezoid A is 8 times the length of the corresponding side of trapezoid B. The area of trapezoid A is how many times as large as the area of trapezoid B?

A) 8
B) 16
C) 32
D) 64

CONTINUE

14

The function f is defined by $f(x)=(-8)(6)^{x}-4$. What is the y-intercept of the graph of $y=f(x)$ in the xy-plane?

A) (0,-12)

B) (0,-8)

C) (0,-4)

D) (0,6)

15

Which of the following expressions is equivalent to $(\sqrt{2q}+\sqrt{r})^{\frac{2}{3}}$, where $q>0$ and $r<0$?

A) $(2q+2r)^3$

B) $\sqrt[3]{2q+2r}$

C) $\sqrt[3]{2q+2\sqrt{qr}+2r}$

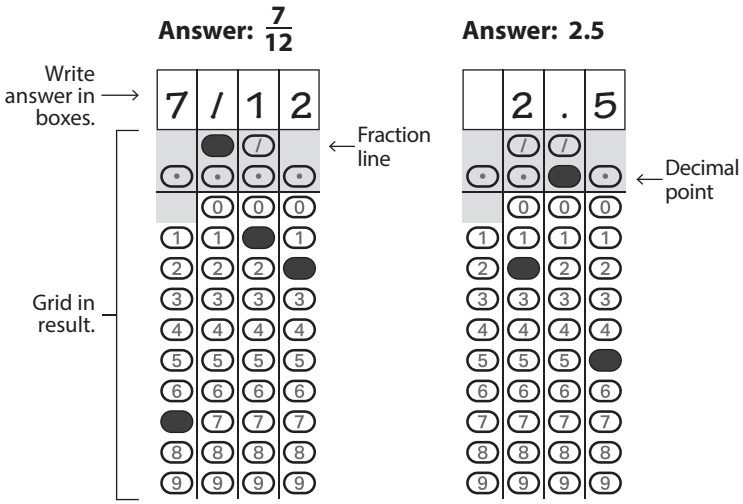
D) $\sqrt[3]{2q+4\sqrt{qr}+2r}$

CONTINUE

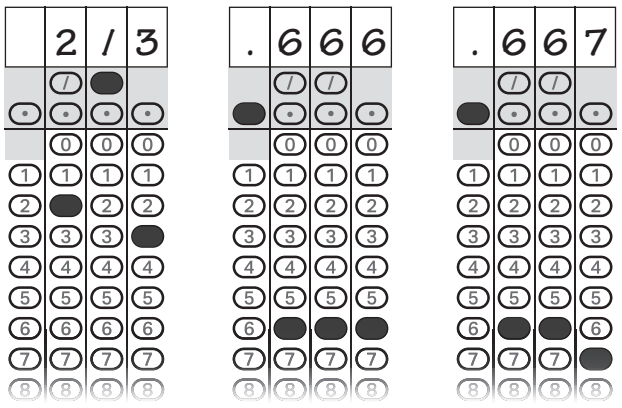
DIRECTIONS

For questions 16-20, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

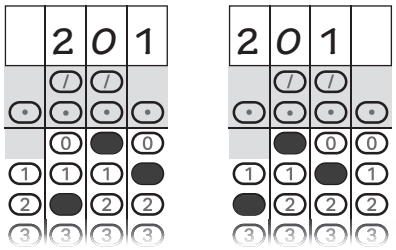
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



NOTE:
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

16

If $3x-9=6$, what is the value of $2x$?

17

$\sqrt{x^2-9}=4$

What is the positive solution to the given equation?

18

Line p is defined by $2y+4x=9$. Line r is perpendicular to line p in the xy-plane. What is the slope of line r ?

19

If $\frac{2x}{3}-2=\frac{x}{3}+1$, what is the value of $2x$?

20

Points A and B lie on a circle with radius 4 meters, and arc $\overset{\frown}{AB}$ has length meters. The length $\frac{4\pi}{5}$ of arc $\overset{\frown}{AB}$ is what fraction of the circumference of the circle?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.

Math Test – Calculator

55 MINUTES, 38 QUESTIONS

Turn to Section 4 of your answer sheet to answer the questions in this section.

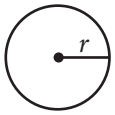
DIRECTIONS

For questions 1-30, solve each problem, choose the best answer from the choices provided, and fill in the corresponding bubble on your answer sheet. **For questions 31-38**, solve the problem and enter your answer in the grid on the answer sheet. Please refer to the directions before question 31 on how to enter your answers in the grid. You may use any available space in your test booklet for scratch work.

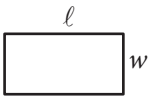
NOTES

1. The use of a calculator **is permitted**.
2. All variables and expressions used represent real numbers unless otherwise indicated.
3. Figures provided in this test are drawn to scale unless otherwise indicated.
4. All figures lie in a plane unless otherwise indicated.
5. Unless otherwise indicated, the domain of a given function f is the set of all real numbers x for which $f(x)$ is a real number.

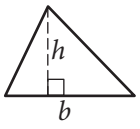
REFERENCE



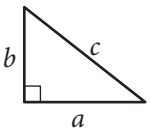
$A = \pi r^2$
$C = 2\pi r$



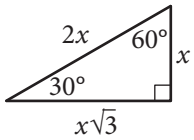
$A = \ell w$

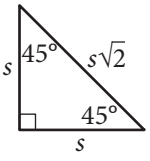


$A = \frac{1}{2}bh$

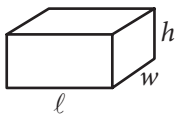


$c^2 = a^2 + b^2$

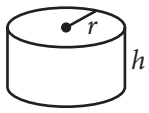




Special Right Triangles

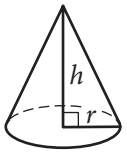


$V = \ell wh$

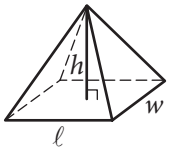


$V = \pi r^2 h$

$V = \frac{4}{3}\pi r^3$



$V = \frac{1}{3}\pi r^2 h$



$V = \frac{1}{3}\ell wh$

The number of degrees of arc in a circle is 360.
The number of radians of arc in a circle is 2π.
The sum of the measures in degrees of the angles of a triangle is 180.

1

The function f is defined by $f(x)=9x-16$. What is the value of $f(3)$?

A) -39

B) -4

C) 11

D) 27

2

$$6x-7=12$$

Which equation has the same solution as the given equation?

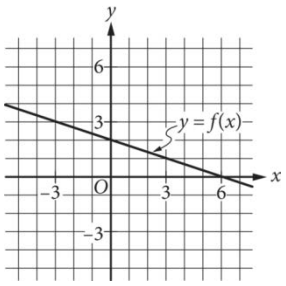
A) $6x=5$

B) $6x=6$

C) $6x=18$

D) $6x=19$

3



The graph of linear function f is shown. What is the y-intercept of the graph of f?

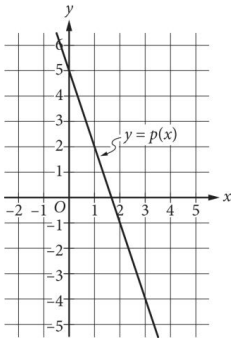
A) (0,0)

B) (0,2)

C) (0,3)

D) (0,6)

4



The graph of the linear function p is shown. Which equation defines p ?

A) $p(x) = -3x + 5$

B) $p(x) = -3x + 2$

C) $p(x) = -\frac{1}{3}x + 5$

D) $p(x) = -\frac{1}{3}x + 2$

5

Of the 50 states in the United States, 12 states are in the Midwest region. What percent of states in the United States are in the Midwest region?

A) 12%

B) 24%

C) 38%

D) 62%

Questions 6-7 refer to the following information.

$T=0.32x+0.29y$

Janice raises chickens. She uses the equation shown to estimate the total daily feed intake T, in pounds, for x male and y female chickens that are between 28 and 35 days old.

6

Using the given equation, Janice estimates that the total daily feed intake for her chickens is 90 pounds. If Janice has 100 male chickens, how many female chickens does she have?

A) 191
B) 200
C) 228
D) 245

7

Which equation estimates the total weekly feed intake W, in pounds, for x male and y female chickens that are between 28 and 35 days old?

A) $w = \frac{0.32x + 0.29y}{7}$

B) $w = \frac{0.32x}{7} + 0.29y$

C) $w = 7(0.32x) + 0.29y$

D) $w = 7(0.32x + 0.29y)$

8

The function g is defined by $g(x) = 4x^2 - 3$. For what positive value of x is $g(x)=13$?

A) 2

B) 4

C) $\frac{\sqrt{10}}{4}$

D) $\frac{\sqrt{10}}{2}$

9

In triangle ABC, the measure of angle A is $23°$ and the measure of angle B is $97°$. In triangle DEF, the measure of angle D is $23°$ and the measure of angle E is $97°$. Which of the following additional pieces of information is needed to determine whether triangle ABC is similar to triangle DEF ?

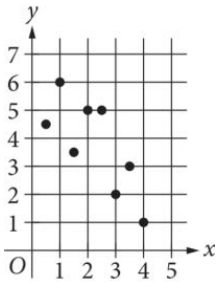
A) The measure of angle C

B) The measure of angle F

C) The measure of angle C and the measure of angle F

D) No additional information is needed.

10



Which of the following linear equations is the most appropriate model for the data shown in the scatterplot?

A) $y=6-x$

B) $y=6+x$

C) $y=-6-x$

D) $y=-6+x$

11

The current density in a wire is defined as the current, in milliamperes, flowing through the wire divided by the cross-sectional area of the wire, in square millimeters. What is the current density, in milliamperes per square millimeter, in a copper wire with a cross-sectional area of 6 square millimeters when a current of 15 milliamperes flows through the wire?

A) 0.4

B) 2.5

C) 15

D) 90

CONTINUE

12

What is the radius of the circle in the xy-plane with equation $(x-9)^2+(y-3)=64$?

A) 64
B) 9
C) 8
D) 3

13

If $\frac{6}{x+1}=3$, what is the value of $x+1$?

A) 0.5
B) 1
C) 2
D) 3

14

Fahari kicks a ball on the ground into the air. One second after being kicked, the ball reaches its maximum height of 16 feet above the ground, and 2 seconds after being kicked, the ball is back on the ground. A quadratic function models the height $h(t)$, in feet, of the ball t seconds after Fahari kicks it. Which equation defines this relationship?

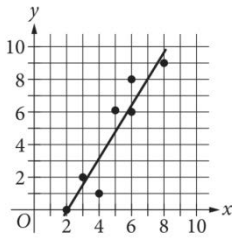
A) $h(t)=-16(t-16)^2+1$

B) $h(t)=-16(t-1)^2+16$

C) $h(t)=-16(t+1)^2-16$

D) $h(t)=-16(t+16)^2-1$

15



The scatterplot shows the relationship between two variables, x and y. A line of best fit is also shown. For how many of the data points is the actual y-value at least 1 greater than the y-value predicted by the line of best fit?

A) 1
B) 2
C) 3
D) 4

16

A 3,000-piece rectangular jigsaw puzzle has 216 edge pieces, and the rest are inside pieces. The equation $48r+216=3{,}000$ describes this situation, where r represents the number of rows that contain inside pieces. Which of the following is the best interpretation of $48r$ in this context?

A) There are $48r$ total pieces.
B) There are $48r$ pieces in each row.
C) There are $48r$ edge pieces.
D) There are $48r$ inside pieces.

17

$$y < -3x + 1$$
$$y < -\frac{1}{2}x + 1$$

Which ordered pair (x, y) is a solution to the given system of inequalities in the xy-plane?

A) $(-2,3)$
B) $(1,2)$
C) $(0,2)$
D) $(-1,1)$

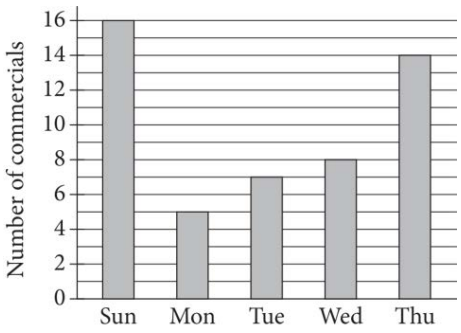
18

Opinions on the Proposal				
	For	Against	Undecided	Total
County 1	526	980	95	1,601
County 2	667	386	91	1,144
Total	1,193	1,366	186	2,745

The table shows the results of a poll that was used to determine support for a county proposal. The results are categorized by county and opinion. If one person who responded to the poll is selected at random, which of the following statements results in the greatest value?

A) The probability that the person is undecided, given that the person is from County 1
B) The probability that the person is undecided, given that the person is from County 2
C) The probability that the person is from County 1, given that the person is undecided
D) The probability that the person is from County 2, given that the person is undecided

19



The bar graph shows the number of commercials Albert saw each day that he watched television last week. For these five days, how much greater is the mean number of commercials per day than the median number of commercials per day?

A) 2

B) 3

C) 5

D) 6

20

A county school board in a certain state is proposing a start time of 7:30 a.m. for all high schools in the county. A sample of 100 high school students was selected at random from all high school students in the county. The selected students were asked whether they approved of the proposed change in the school start time, and 70 students responded that they did not approve of the proposed change. Which of the following is the largest population to which the results of the survey can be generalized?

A) The 70 students who responded that they did not approve of the proposed change

B) The 100 students who were surveyed

C) All high school students in the county

D) All high school students in the state

Questions 21-22 refer to the following information.

The bar graph shown summarizes the total number of businesses, in thousands, and the total number of tourism-related businesses, in thousands, in Iceland for each of 7 years.

21

Tourism-related businesses employed 13.5 thousand people in Iceland in 2009. Which of the following is closest to the mean number of employees per tourism-related business in Iceland in 2009?

A) 5

B) 14

C) 23

D) 58

22

In 2008, what percentage of the total businesses in Iceland were tourism-related?

A) 52%

B) 20%

C) 5%

D) 2%

23

The heat capacity of a substance is the amount of energy, in joules (J), required to raise the temperature of 1 gram (g) of the substance by 1 degree Celsius (°C). The heat capacity of water is approximately 4.2 $\frac{J}{g \cdot °C}$. Approximately how much energy, in joules, is required to raise the temperature of 1.0 g of water from 22°C to 30°C?

A) 1.9
B) 8.0
C) 34
D) 92

24

$$v = (1{,}000)(1.05)^t$$

The given equation models the value of an antique dresser t years after its restoration, where $0 \le t \le 5$. Which of the following equations best models the value of the dresser m months after its restoration, where $0 \le m \le 60$?

A) $v = (\frac{1{,}000}{12})(1.05)^m$

B) $v = (1{,}000)(\frac{1.05}{12})^m$

C) $v = (1{,}000)(1.05)^{\frac{m}{12}}$

D) $v = (1{,}000)(1.05)^{12m}$

25

$$(x-5)^2 + 10(x-5) + 25 = 0$$

How many distinct real solutions does the given equation have?

A) Zero
B) Exactly one
C) Exactly two
D) Infinitely many

26

$$4x - y = 3$$

One of the two equations in a linear system is given. The system has exactly one solution. Which equation could be the other equation in the system?

A) $-4x + y = 6$
B) $4x - y = 3$
C) $4x + y = 5$
D) $4x - y = 5$

27

A drawing of an object has a scale where a length of 4 inches on the drawing represents an actual length of 9 feet. The actual length of the object is $12y$ feet. Which expression represents the length, in inches, of the object in the drawing?

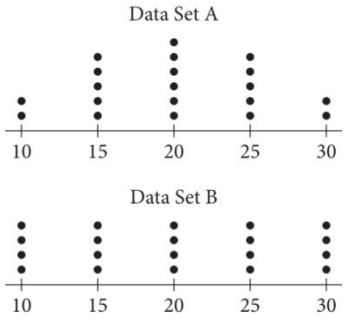
A) $\frac{4}{3}y$

B) $3y$

C) $\frac{16}{3}y$

D) $27y$

28



The dot plots shown each represent a data set. Which of the following statements best compares the means and the standard deviations of the two data sets?

A) The means are equal; the standard deviation of data set A is less than the standard deviation of data set B.

B) The means are equal; the standard deviation of data set A is greater than the standard deviation of data set B.

C) The standard deviations are equal; the mean of data set A is less than the mean of data set B.

D) The standard deviations are equal; the mean of data set A is greater than the mean of data set B.

29

The expression $0.7x$ represents the result of decreasing a positive quantity x by what percent?

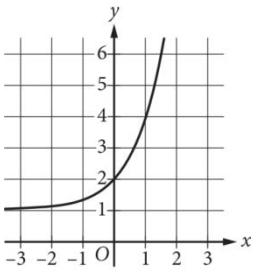
A) 70%

B) 30%

C) 7%

D) 3%

30



The graph of $y=f(x)+1$ is shown. Which equation defines the function f?

A) $f(x) = 2^x$

B) $f(x) = 3^x$

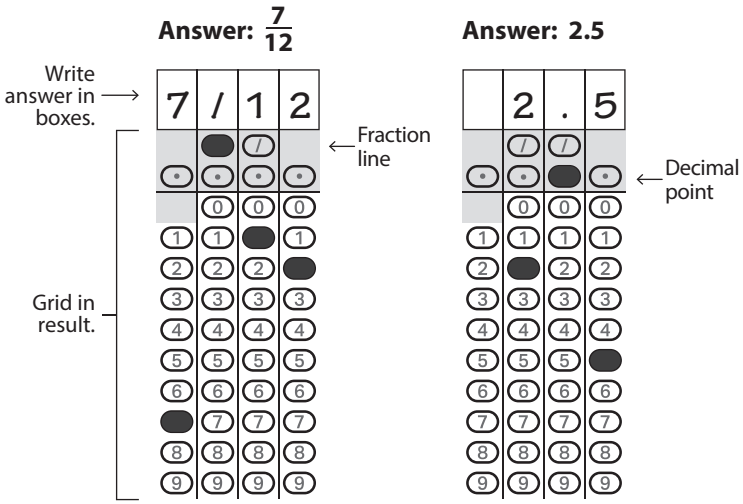
C) $f(x) = 2^x + 1$

D) $f(x) = 3^x + 2$

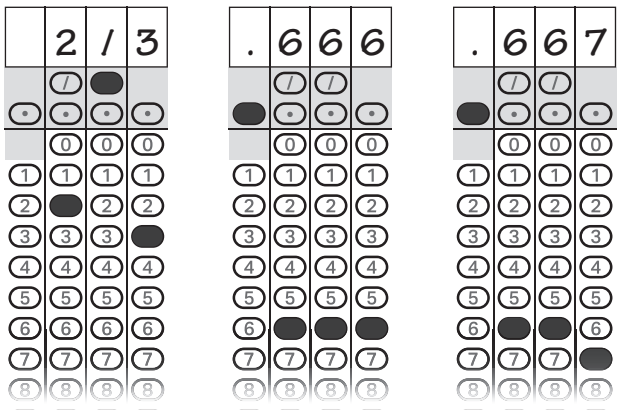
DIRECTIONS

For questions 31-38, solve the problem and enter your answer in the grid, as described below, on the answer sheet.

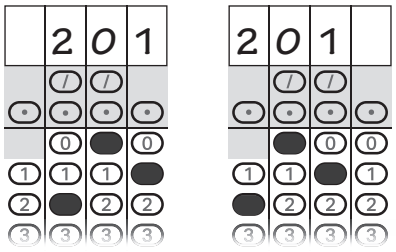
1. Although not required, it is suggested that you write your answer in the boxes at the top of the columns to help you fill in the bubbles accurately. You will receive credit only if the bubbles are filled in correctly.
2. Mark no more than one bubble in any column.
3. No question has a negative answer.
4. Some problems may have more than one correct answer. In such cases, grid only one answer.
5. **Mixed numbers** such as $3\frac{1}{2}$ must be gridded as 3.5 or 7/2. (If is entered into the grid, it will be interpreted as $\frac{31}{2}$, not $3\frac{1}{2}$.)
6. **Decimal answers:** If you obtain a decimal answer with more digits than the grid can accommodate, it may be either rounded or truncated, but it must fill the entire grid.



Acceptable ways to grid $\frac{2}{3}$ are:



Answer: 201 – either position is correct



NOTE:
You may start your answers in any column, space permitting. Columns you don't need to use should be left blank.

31

Over a period of one year, two points on opposite sides of a mid-ocean ridge moved a distance of 4 centimeters farther apart. What is this distance, in meters? (1 meter = 100 centimeters)

32

If $7(x-3)=2(x-3)$, what is the value of $(x-3)$?

33

One of the factors of $2x^3 + 14x^2 + 24x$ is $x+b$, where b is a positive constant. What is one possible value of b?

34

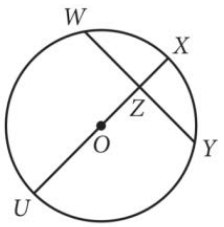
Class size	Frequency
21	10
22	13
23	30
24	36
25	20

The table shows the distribution of class sizes for the 109 classes of a high school. What is the median class size at the high school?

35

When Arban walks from home to class, he burns 4.2 calories per minute, and when he rides his bike from home to class, he burns 5.1 calories per minute. If Arban spent a total of 2 hours walking and bicycling from home to class in a week and burned a total of 531 calories, how many minutes did he spend walking?

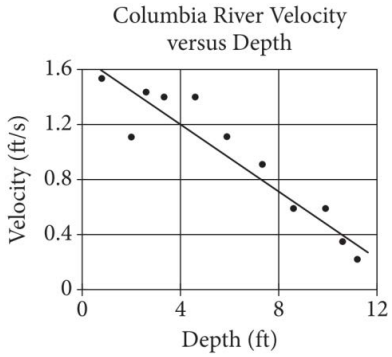
36



Note: Figure not drawn to scale.

In the circle shown, point O is the center, and diameter $\overline{UX}$ bisects $\overline{WY}$ at point Z. The radius of the circle is 6, and $XZ=2$. If $WZ = \sqrt{x}$, what is the value of x ?

Questions 37 and 38 refer to the following information.



At a certain location in the Columbia River, the velocity of the water flow at different depths was measured. The scatterplot shown gives 11 measurements of the velocity v, in feet per second (ft/s), of the water at various depths d, in feet. A line of best fit for the data is also shown.

37

According to the line of best fit, what is the predicted velocity of the water flow, in feet per second, at a depth of 4 feet?

38

For what fraction of the data points in the scatterplot is the velocity of the water flow predicted by the line of best fit greater than the measured velocity?

STOP

If you finish before time is called, you may check your work on this section only.
Do not turn to any other section.